

ABSTRACT

[0084] A method of forming a composite tungsten film on a substrate is described. The composite tungsten film comprises sequentially deposited tungsten nucleation layers and tungsten bulk layers. Each of the tungsten nucleation layers and the tungsten bulk layers have a thickness less than about 300 Å. The tungsten nucleation layers and the tungsten bulk layers are formed one over the other until a desired thickness for the composite tungsten film is achieved. The resulting composite tungsten film exhibits good film morphology. The tungsten nucleation layers may be formed using a cyclical deposition process by alternately adsorbing a tungsten-containing precursor and a reducing gas on the substrate. The tungsten bulk layers may be formed using a chemical vapor deposition (CVD) process by thermally decomposing a tungsten-containing precursor.